

Docket No.520.43324X00
Serial No.10/729,967
Office Action dated August 23, 2007

REMARKS

I. Introduction

By the present Amendment, claims 8 and 9 have been amended. Claims 11 and 13 have been cancelled. Accordingly, claims 8-10 and 12 remain pending in the application. Claim 8 is independent.

II. Office Action Summary

In the Office Action of August 23, 2007, claims 8-10 were objected to because of various informalities. Claims 8 and 10-13 were rejected under 35 USC §103(a) as being unpatentable over Japanese Patent Publication No. JP 2002-063927 to Yamamoto et al. ("Yamamoto") in view of U.S. Patent Application Publication No. 20004/0095023 to Jacobson et al. ("Jacobson"). Claim 9 was rejected under 35 USC §103(a) as being unpatentable over Yamamoto in view of Jacobson and further in view of U.S. Patent Application Publication No. 2002/0131285 to Kawakami and U.S. Patent Application Publication No. 2003/0159865 to Schmidt.

The cancellation of claims 11 and 13 has rendered part of these grounds of objections and rejections moot. Regarding the remaining claims, these rejections are respectfully traversed.

III. Objections to the Claims

Claims 8-10 were objected to because of various informalities. Regarding this objection, the Office Action cites several instances of language that was considered indefinite and/or otherwise lacking in proper antecedent basis. For example, the Office Action listed the phrases "the receiving current," "the power

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command value," and "the current command value" recited in claims 8, 9, and 10, respectively, lacked proper antecedent basis.

By the present Amendment, Applicants have amended claims 8 and 9 to provided proper antecedent basis for the phrases cited in the Office Action. Withdrawal of this objection is therefore respectfully requested.

IV. Rejections under 35 USC §103

Claims 8 and 10-13 were rejected under 35 USC §103(a) as being unpatentable over Yamamoto in view of Jacobson. Regarding this rejection, the Office Action indicates that Yamamoto discloses a fuel cell control system that includes most of the features recited in independent claim 8. The Office Action admits that Yamamoto fails to disclose detection of currents and voltages, and calculation of the power at particular points in the circuit. Jacobson is relied upon for disclosing voltage and current sensors in each segment of a system and sending those values to the control circuit. The Office Action further indicates that Jacobson discloses calculation of the power using the power and voltage values obtained via the sensors.

As amended, independent claim 8 defines a fuel cell system control unit that comprises:

- a first converter electrically connected to an electric power system through a circuit-breaker means;
- an electric load connected to an electric line which ties the electric power system and the first converter;
- a set of fuel cells connected to a DC circuit of said first converter through a second converter;
- a secondary battery connected to said DC circuit through a third converter;

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a current detecting means which detects AC currents from said converters and outputs their detected values;

a voltage detecting means which detects an AC voltage on the power system side of said circuit breaker means and outputs its detected value;

a fuel cell current detecting means which detects a current from said fuel cell set;

a fuel cell voltage detecting means which detects the voltage of said fuel cell set;

a secondary battery current detecting means which detects a current from said secondary battery;

a secondary battery voltage detecting means which detects the voltage of said secondary battery;

a receiving current detector for detecting the total of a current flowing through said first converter and a current flowing through an electric load connected in parallel with said first converter;

means for calculating a receiving electric power from a receiving current detected by said receiving current detector and a system voltage detected by said system voltage detecting means;

means for calculating the output power of the first power converter;

means for calculating the load power which the load consumes based on the receiving power and the output power of the first power converter;

means for controlling the first-third power converters so that the output power of the first power converter approaches the load power, said means for controlling further comprising means for causing the secondary battery to output power when said receiving power exceeds the preset receiving power value due to the increase of said load power; and

means for calculating a current command value output by the fuel cells from said detected load power value to make power output by said second converter approximately equal to said load power.

According to independent claim 8, the fuel cell system control unit includes a first converter that is electrically connected to an electric power system through a circuit breaker means. An electric load is connected to an electric line which ties the electric power system to the first converter. A set of fuel cells is connected to the

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DC circuit of the converter through a second converter. A secondary battery is connected to the DC circuit through a third converter. A current detecting means is provided to detect AC currents from the converters and output their detected values. A voltage detecting means detects AC voltage on the power system side of the circuit breaker means and outputs its detected value. A fuel cell current detecting means and fuel cell voltage detecting means are respectfully provided to detect current and voltage from the set of fuel cells. A secondary battery current detecting means and secondary battery voltage detecting means are respectively provided to detect current and voltage from the main battery.

A receiving current detector (IL1) detects the total current flowing through the first converter and the current flowing through an electric load (3) connected in parallel with the first converter (1-1c). The fuel cell system control unit includes means for calculating a receiving electric power based on the receiving current detected by the receiving current detector and a system voltage detected by the system voltage detecting means. Means are provided for calculating the output power of the first power converter, and for calculating the load power which the load consumes based on the received power and the output power of the first power converter. See page 16, line 6 to page 17, line 4; and page 18, lines 1-15.

Additionally, the unit includes means for controlling the first-third power converters so that the output power of the first converter approaches the load power, and means for calculating a current command value output by the fuel cells from the detected load power value to make the power output by the second converter approximately equal. Further, according to independent claim 8, the means for controlling the power converters also includes means for causing the secondary

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battery to output power when the receiving exceeds the preset receiving power value due to the increase of the load power.

At least one benefit achieved by the present invention is the ability to detect a receiving power and cuts its peaks by the secondary battery according to it. This can prevent the receiving power from going over the permissible receiving power value due to the delay of output of the power generating apparatus. See page 25, lines 2-6. The present invention is also capable of using the load power for creation of fuel cell command values, thereby separating the power from the secondary battery and making the fuel cell follow the load power. See page 25, line 12 to page 26, line 7. Additionally, the present invention provides various additional advantages, including the ability to cause the power generating apparatus to follow the low-frequency component in the fluctuation of the load power thereby downsizing the secondary battery as a long great power from the secondary battery is not required; preventing frequent fuel supply change due to load fluctuations; and prevent deterioration of the electrodes.

The Office Action had previously indicated that Yamamoto disclosed numerous features recited in independent claim 8. Jacobson was relied upon for teaching various features that were not disclosed by Yamamoto. By the present Amendment, however, independent claim has been revised to incorporate features that are not disclosed or suggested by the art of record, taken individually or in combination with each other.

It is therefore respectfully submitted that independent claim 8 is allowable over the art of record.

Claims 9, 10, and 12 depend from independent claim 8, and are therefore believed allowable for at least the reasons set forth above with respect to

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independent claim 8. In addition, these claims each introduce novel elements that independently render them patentable over the art of record.

For the reasons stated above, it is respectfully submitted that all of the pending claims are now in condition for allowance. Therefore, the issuance of a Notice of Allowance is believed in order, and courteously solicited.

If the Examiner believes that there are any matters which can be resolved by way of either a personal or telephone interview, the Examiner is invited to contact Applicants' undersigned attorney at the number indicated below.

V. Conclusion

For the reasons stated above, it is respectfully submitted that all of the pending claims are now in condition for allowance. Therefore, the issuance of a Notice of Allowance is believed in order, and courteously solicited.

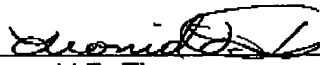
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AUTHORIZATION

Applicants request any shortage or excess in fees in connection with the filing of this paper, including extension of time fees, and for which no other form of payment is offered, be charged or credited to Deposit Account No. 01-2135 (Case: 520.43324X00).

Respectfully submitted,
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